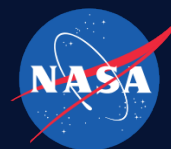


Minimalistic Advanced SoftGoods Hatch (MASH) Project

Game Changing Development Program | Space Technology Mission

Directorate (STMD)



ANTICIPATED BENEFITS

To NASA funded missions:

High strength softgoods and inflatable structures development have been identified as beneficial technologies for deep space habitation, and considered required technologies for long-term surface habitation by the NASA Human Spaceflight Architecture Team (HAT). The game changing capability is that an inflatable pressure stabilized softgoods structural volume can be depressurized, compressed, and stowed within or around a port of a space vehicle. With the structure stowed on the side of the vehicle, the stowed configuration has the potential to reduce the launch stack for expected mission architectures. A promising concept proposed for the Evolvable Mars Campaign (EMC) missions is a stowable minimalistic airlock, tunnel, access way, or alcove that packages within the hatch/docking access port for utilization during EVA.

DETAILED DESCRIPTION

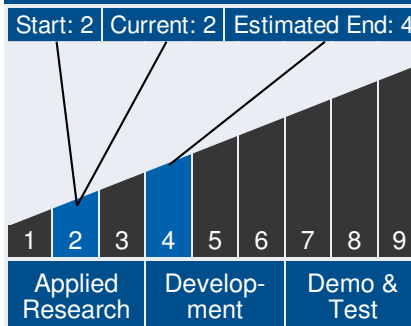
MASH project will mature structures and materials technologies with direct application to NASA's future space exploration missions. MASH is developing a lightweight novel soft-goods hatch for in-space applications.



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Technology Maturity



Management Team

Program Executive:

- Lanetra Tate

Program Manager:

- Mary Wusk

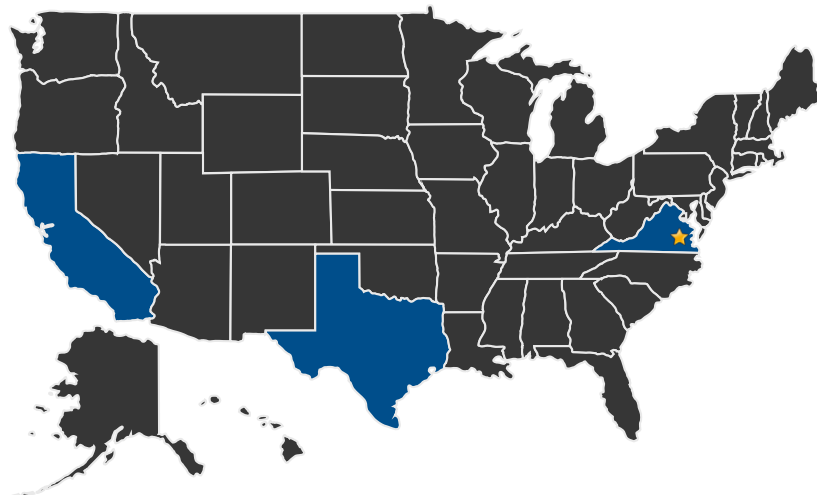
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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Langley Research Center

Other Organizations Performing Work:

- Altair Engineering
- ILC Dover
- InnoCentive

Management Team (*cont.*)

Project Manager:

- David Moore

Principal Investigator:

- David McGowan

Technology Areas

Primary Technology Area:

Human Exploration Destination Systems (TA 7)

└ Human Mobility Systems (TA 7.3)

└ EVA Mobility (TA 7.3.1)

└ Advanced Airlock/Suitlock (TA 7.3.1.6)

└ Advanced Airlock/Suitlock (TA 7.3.1.6)

Secondary Technology Area:

Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

└ Materials, Structures, Mechanical Systems and Manufacturing (TA 12)

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Technology Areas (cont.)

Additional Technology Areas:

Materials, Structures, Mechanical
Systems and Manufacturing (TA
12)

- └ Materials (TA 12.1)

- └ Flexible Material
Systems (TA 12.1.3)

- └ Structures (TA 12.2)

- └ Lightweight Concepts (TA
12.2.1)

- └ Mechanical Systems (TA
12.3)

- └ Deployables, Docking, and
Interfaces (TA 12.3.1)

DETAILS FOR TECHNOLOGY 1

Technology Title

Development and utilization of high strength woven fabric materials for lightweight structures

Technology Description

This technology is categorized as a hardware component or part for manned spaceflight

Inflatable softgoods structures technology offers large on-orbit pressurized module working environments for utilization by astronauts or for storage of hardware items. These low mass and large volume structures are typically stowed in small packages prior to launch and deployed and pressurized on orbit to their final large configuration. The low launch mass and volume characteristics, reduces launch costs, relative to metallic and composite module structures. Specific to the MASH project the inflatable structure will be packaged within or around a hatch/docking access port of a rigid metallic habitable module/vehicle.

Capabilities Provided

Inflatable softgoods structures have unique characteristics, which allow a mission designer to expand beyond traditional approaches with rigid metallic or composite structures. Some of the novel capabilities of inflatable structures are listed below.

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- Compact packaging prior to launch
- High-G launch durability
- Configurable and scalable to a variety of spherical or cylindrical geometric shapes
- Low cost
- Low-mass
- Potential to be rigidized on-orbit
- Potential to be attached to a variety of locations on a spacecraft vehicle

Specific to the MASH project the inflatable structure will be packaged within or around a hatch/docking access port of a rigid metallic habitable module/vehicle to enable EVA.

Potential Applications

Inflatable structures have been identified as a near term beneficial technology for deep space habitation, and considered required technology for longer term surface habitation by the NASA Human Spaceflight Architecture Team (HAT). Potential applications of this technology include inflatable airlocks, access ways, and connecting tunnels.